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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/530,777

10/17/2005

Ziya Ramizovich Karichev

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LADAS & PARRY LLP
26 WEST 61ST STREET
NEW YORK, NY 10023

EXAMINER

HAWKINS, KARLA

ART UNIT

PAPER NUMBER

4112

MAIL DATE

DELIVERY MODE

07/22/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/530,777	Applicant(s) KARICHEV ET AL.	
	Examiner KARLA HAWKINS	Art Unit 4112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/07/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Summary

1. This is the initial office action based on the 10/530,777 application filed October 17th, 2005.
2. The preliminary amendment filed April 07, 2005 has been entered and fully considered.
3. Claims 1-8 are pending and have been fully considered.

Claim Rejections – 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 3-8 are rejected under 35 U.S.C. 102(b) as being anticipated by **TOWLER ET AL. (US 6,299,994)**, as evidenced by **GALLAGHER ET AL. (US 5,540,981)**.
6. With respect to claim 1, **TOWLER** discloses a hydrogen generation process of the present invention that solves a number of problems of operating such hydrogenation production system in conjunction with fuel cells (col. 5, lines 56-59) *a method for purifying air for fuel cells*. The process comprises a pressure swing adsorption zone or a thermal swing adsorption zone containing an adsorbent selective for the removal of carbon oxides prior to passing the hydrogen product to the fuel cell (claim 17). The hydrogen product stream comprises hydrogen, carbon monoxide, *carbon dioxide*, and

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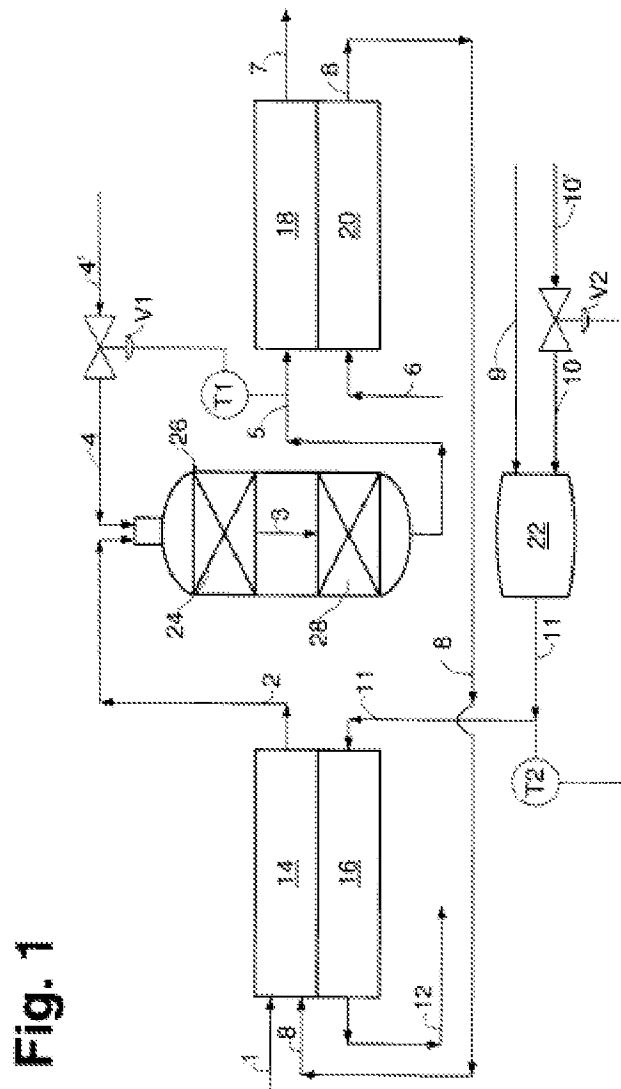
water. The hydrogen product stream is passed to a pressure swing adsorption zone or a temperature swing adsorption zone to produce a high purity hydrogen stream (col. 7, lines 40-44) *the air is passed through an adsorber with an adsorbent of carbon dioxide*. The heat for the reforming process can be provided by the heat of combustion of waste gases from the fuel cell (col. 10, lines 28-30) *the adsorbent is regenerated by heating*. During this process a high temperature shift effluent is passed to a low temperature shift zone and contacted with low temperature shift catalyst to further reduce carbon monoxide. Types of low temperature shift catalysts include transition metals oxides such as zirconia (col. 14, lines 14-22) *the adsorbent comprising hydrated oxides of transition metals*. However it is inherently taught as evidence by **GALLAGHER** et al., wherein **GALLAGHER** et al. teaches zirconia is prepared from precipitated zirconium hydroxide (col. 9, lines 27-30).

TOWLER goes on to disclose for a PEM fuel cell, the carbon oxide reduced hydrogen product gas is at a temperature less than about 100 degrees Celsius (col. 15, lines 11-14) *regenerated at a temperature of 60-120 degrees Celsius by the air spent in the fuel cell*.

7. With respect to claims 3 and 4, **TOWLER** teaches an embodiment of the disclosed hydrogen generation process comprising: lines (*pipelines*) 1-12; stop valves V1 and V2; an adsorption tower that includes a partial oxidation zone 24; reaction zone 26; and the reforming zone 28 (figure 1). **TOWLER** also discloses in example 1 in the scheme for processing natural gas air is passed through a compressor (col. 22, lines

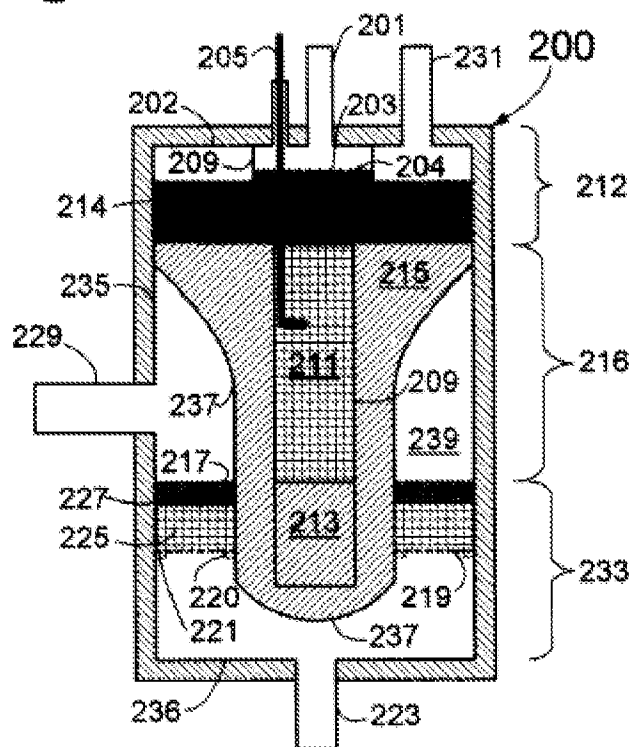
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14-17) and power is consumed by the compressor and an air *blower* within a second air stream is introduced at a second air rate (col. 22, lines 54-56).



8. With regard to claim 4, TOWLER discloses a combined reaction zone apparatus 200 comprising: an intermediate partition 237 is sealingly disposed on the side-wall 235 in the center shell zone 216(col. 20, lines 17-21, figure 3) *characterized in that the adsorbers, separated one from another by partitions, are positioned in one housing.*

Fig. 3



9. With regard to claims 5 and 7, **TOWLER** teaches during this process a high temperature shift effluent is passed to a low temperature shift zone and contacted with low temperature shift catalyst to further reduce carbon monoxide. Types of low temperature shift catalysts include transition metals oxides such as zirconia (col. 14, lines 14-22) *the adsorbent comprising hydrated oxides of transition metals*. However it is inherently taught as evidence by **GALLAGHER** et al., wherein **GALLAGHER** et al. teaches zirconia is prepared from precipitated zirconium hydroxide (col. 9. lines 27-30).

10. With regard to claim 6 and 8, **TOWLER** discloses the reforming effluent stream is passed through a reaction zone containing at least one gas shift catalyst (*adsorber*)

combined reaction zone has a side-wall 235 is insulated and defines an interior reactor zone (col. 20, lines 17-21) *thermal insulation is arranged inside the adsorbers.*

11. Again, **GALLAGHER** et al. is considered a teaching reference, not a modifying reference. See MPEP 2112.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 2 is rejected under 35 U.S.C. 103(a) as being obvious over **TOWLER ET AL. (US 6,299,994)** in view of **CHRISTEL Jr. ET AL. (US 4832711)**.

14. **TOWLER** discloses a hydrogen generation process containing an adsorbent selective for the removal of carbon oxides with a low temperature shift catalysts including transition metals oxides such as zirconia reduced at a temperature less than about 100 degrees Celsius.

15. Although **TOWLER** teaches the humidity of the hydrogen product stream is controlled, **TOWLER** does not appear to explicitly disclose a relative humidity from 15 to 85%.

16. However, **CHRISTEL Jr.** et al. discloses an adsorbent apparatus provided for reducing the concentration of gas in a mixture (abstract). **CHRISTEL Jr.** also teaches the apparatus working with air at 80% relative humidity, which is typical of that obtainable using any desiccant under any adsorption condition (col. 6, lines 22-25).

TOWLER and **CHRISTEL Jr.** are analogous art because they are from the *same field of endeavor* of gas separation using adsorption.

17a. At the time of the invention, it would have been obvious to one of ordinary skill in the art to control the humidity of **TOWLER** by requiring it to be 80% relative humidity as taught by **CHRISTEL Jr.**

13b. The motivation would have since **CRISTEL Jr.** discloses that this is a typical relative humidity under any adsorption condition. Which is inclusive of **TOWLER's** and the applicants adsorption conditions.

14. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. MILLET ET AL. teaches a gas separation process with at least 1 adsorber that adsorbs carbon dioxide with a regeneration temperature of 50-250C.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KARLA HAWKINS whose telephone number is (571) 270-5562. The examiner can normally be reached on M-Th 7:30- 5, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on 571-272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Karla Hawkins
Examiner
Art Unit 4112

/Barbara L. Gilliam/
Supervisory Patent Examiner, Art Unit 4128